

# Schedule

## Week 1 (09/07-9/11)

- Day 1
  - Introduction to Theory of Computation<sup>1</sup>
  - Introduction to OCAML<sup>2</sup>
  - Assignment 1<sup>3</sup>
- Day 2
  - OCAML basics<sup>4</sup>
- Day 3
  - OCAML basics (cont)<sup>5</sup>
- Day 4
  - OCAML basics (cont)<sup>6</sup>
  - OCAML example: sets as lists (optional)<sup>7</sup>

## Week 2 (09/14-09/18)

- Day 1
  - Alphabets, strings, substrings, empty string, lexicographic ordering<sup>8</sup>
  - Alphabet and friends in OCAML<sup>9</sup>
  - Assignment 2<sup>10</sup>
- Day 2
  - Languages, examples, constructions<sup>11</sup>
- Day 3
  - Languages, examples, constructions<sup>12</sup>
- Day 4
  - Deterministic Finite Automata<sup>13</sup>

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<sup>1</sup>[notes/theory\\_intro.html](#)

<sup>2</sup>[notes/ocaml\\_intro.html](#)

<sup>3</sup>[assignments/1.html](#)

<sup>4</sup>[notes/ocaml\\_basics.html](#)

<sup>5</sup>[notes/ocaml\\_basics.html](#)

<sup>6</sup>[notes/ocaml\\_basics.html](#)

<sup>7</sup>[notes/ocaml\\_sets.html](#)

<sup>8</sup>[notes/alphabet.html](#)

<sup>9</sup>[notes/ocaml\\_alphabet.html](#)

<sup>10</sup>[assignments/2.html](#)

<sup>11</sup>[notes/languages.html](#)

<sup>12</sup>[notes/languages.html](#)

<sup>13</sup>[notes/fin\\_aut\\_dfa.html](#)

## Week 3 (09/21-09/25)

- Day 1
  - Deterministic Finite Automata (cont)<sup>14</sup>
- Day 2
  - DFAs in OCAML<sup>15</sup>
- Day 3
  - Regular Languages<sup>16</sup>
  - Union of regular languages is regular<sup>17</sup>
- Day 4
  - Implementation of union in OCAML<sup>18</sup>
  - Assignment 3<sup>19</sup>

## Week 4 (09/28-10/02)

- Day 1
  - Non-deterministic automata, examples<sup>20</sup>
  - Implementation in OCAML
- Day 2
  - DFA equivalent to an NFA<sup>21</sup>
- Day 3
  - Regular Expressions<sup>22</sup>
  - RegEx -> NFA
- Day 4
  - Nonregular languages and the Pumping Lemma<sup>23</sup>
  - Assignment 4<sup>24</sup>
  - Catching up

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<sup>14</sup>[notes/fin\\_aut\\_dfa.html](#)

<sup>15</sup>[notes/ocaml\\_dfa.html](#)

<sup>16</sup>[notes/fin\\_aut\\_dfa.html](#)

<sup>17</sup>[notes/fin\\_aut\\_dfa.html](#)

<sup>18</sup>[notes/ocaml\\_dfa.html](#)

<sup>19</sup>[assignments/3.html](#)

<sup>20</sup>[notes/fin\\_aut\\_nfas.html](#)

<sup>21</sup>[notes/fin\\_aut\\_nfas.html](#)

<sup>22</sup>[notes/regexp.html](#)

<sup>23</sup>[notes/nonregular.html](#)

<sup>24</sup>[assignments/4.html](#)

## Week 5 (10/05-10/09)

- Day 1
  - Lexers<sup>25</sup>
- Day 2
  - Review
- Day 3
  - Midterm 1 (study guide<sup>26</sup>)
- Day 4
  - Context Free Grammars<sup>27</sup>
  - Examples of derivations
  - Ambiguous grammars

## Week 6 (10/12-10/16)

- Day 1
  - Programming examples of CFGs
  - Chomsky Normal Forms<sup>28</sup>
- Day 2
  - Pushdown Automata definition<sup>29</sup>
- Day 3
  - PDAs more examples
- Day 4
  - CFG  $\rightarrow$  PDA<sup>30</sup>

## Week 7 (10/19-10/23)

- Day 1
  - Fall Break
- Day 2

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<sup>25</sup>[notes/lexers.html](#)

<sup>26</sup>[notes/midterm1\\_study\\_guide.html](#)

<sup>27</sup>[notes/cfg.html](#)

<sup>28</sup>[notes/cfg.html](#)

<sup>29</sup>[notes/pushdown\\_automata.html](#)

<sup>30</sup>[notes/cfg\\_pda.html](#)

- Pumping lemma for CFGs<sup>31</sup>
  - Non-context-free grammars
- Day 3
  - Basics of Parsing, First/Follow sets<sup>32</sup>
- Day 4
  - Basics of Parsing, First/Follow sets<sup>33</sup>
  - Assignment 5<sup>34</sup>

## Week 8 (10/26-10/30)

- Day 1
  - Basics of Parsing, LL(k) parsers<sup>35</sup>
- Day 2
  - Basics of Parsing, LR(k) parsers<sup>36</sup>
- Day 3
  - Basics of Parsing, LR(k) parsers<sup>37</sup>
- Day 4
  - Turing Machines<sup>38</sup>
  - Assignment 6<sup>39</sup>

## Week 9 (11/02-11/06)

- Day 1
  - Turing Machines, examples<sup>40</sup>
- Day 2
  - Multitape / Nondeterministic Turing machines<sup>41</sup>
- Day 3

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<sup>31</sup>[notes/pumping\\_cfg.html](#)

<sup>32</sup>[notes/parsing.html](#)

<sup>33</sup>[notes/parsing.html](#)

<sup>34</sup>[assignments/5.html](#)

<sup>35</sup>[notes/parsing.html](#)

<sup>36</sup>[notes/parsing.html](#)

<sup>37</sup>[notes/parsing.html](#)

<sup>38</sup>[notes/turing.html](#)

<sup>39</sup>[assignments/6.html](#)

<sup>40</sup>[notes/turing.html](#)

<sup>41</sup>[notes/turing.html](#)

- Multitape / Nondeterministic Turing machines<sup>42</sup>
- Day 4
  - The Church-Turing thesis, algorithms
  - Assignment 7<sup>43</sup>

## **Week 10 (11/09-11/13)**

- Day 1
  - Decidable Problems, for regular languages
- Day 2
  - Catching up
- Day 3
  - Midterm 2 (study guide<sup>44</sup>)
- Day 4
  - The Halting Problem

## **Week 11 (11/16-11/20)**

- Day 1
  - Undecidability of Halting Problem
- Day 2
  - Reducibility
- Day 3
  - Regularity of languages is undecidable
- Day 4
  - Time Complexity classes

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<sup>42</sup>[notes/turing.html](#)

<sup>43</sup>[assignments/7.html](#)

<sup>44</sup>[notes/midterm2\\_study\\_guide.html](#)

## **Week 12 (11/23-11/27)**

- Day 1
  - The class P
- Day 2
  - Thanksgiving Break
- Day 3
  - Thanksgiving Break
- Day 4
  - Thanksgiving Break

## **Week 13 (12/01-12/04)**

- Day 1
  - The class NP
- Day 2
  - P vs NP, NP-complete problems
- Day 3
- Day 4

## **Week 14 (12/07-12/11)**

- Day 1
- Day 2
- Day 3
- Day 4